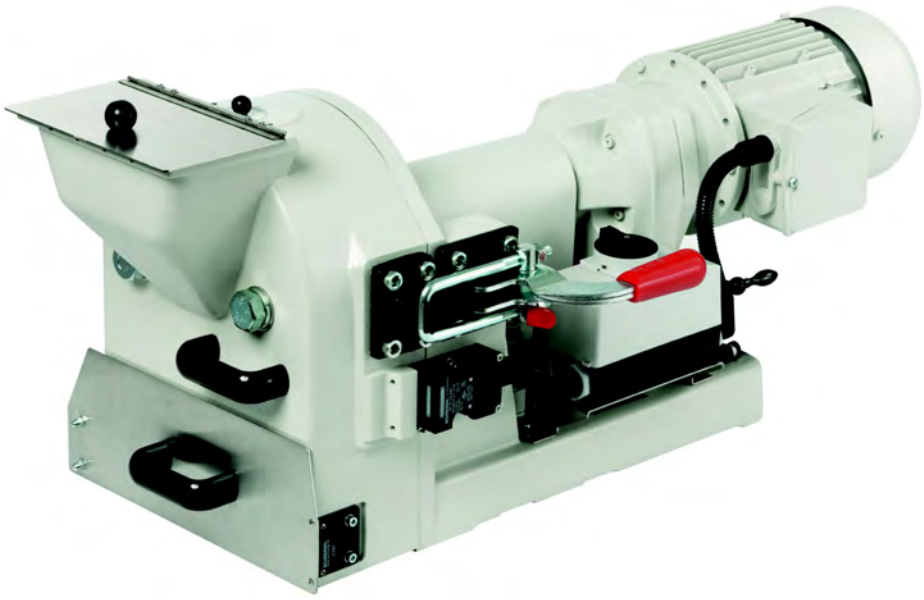
Operating instructions

DISK MILL

PULVERISETTE 13 *classic line*

Valid starting with: 13.10xx/460



Read the instructions prior to performing any task!

Translation of the original operating instructions

Fritsch GmbH
Milling and Sizing
Industriestraße 8
D - 55743 Idar-Oberstein
Telephone: +49 (0)6784/ 70-0
Fax: +49 (0)6784/ 70-11
email: info@fritsch.de
Internet: www.fritsch.de

Certifications and CE conformity

Certification

Fritsch GmbH has been certified by the TÜV-Zertifizierungsgemeinschaft e.V.

TGA-ZM-05-08-00

An audit certified that Fritsch GmbH conforms to the requirements of the DIN EN ISO 9001:2008.

CE Conformity

The enclosed Conformity Declaration lists the guidelines the FRITSCH instrument conforms to, to be able to bear the CE mark.

Table of contents

1 Basic structure ... 6

2 Safety information and use ... 7

2.1 Requirements for the user ... 7
2.2 Scope of application ... 7
2.2.1 Operating principle ... 8
2.2.2 Drive motor ... 8
2.3 Obligations of the operator ... 8
2.4 Information on hazards and symbols used in this manual ... 9
2.5 Device safety information ... 12
2.6 Protective equipment ... 13
2.7 Hazardous points ... 14
2.8 Electrical safety ... 14
2.8.1 General information ... 14
2.8.2 Protection against restart ... 14
2.8.3 Overload protection ... 14

3 Technical data ... 15

3.1 Dimensions ... 15
3.2 Weight ... 15
3.3 Operating noise ... 15
3.4 Voltage ... 15
3.5 Current consumption ... 15
3.6 Power consumption ... 15
3.7 Speed ... 15
3.8 Electrical fuses ... 16
3.9 Material ... 16
3.10 Final fineness ... 16

4 Installation ... 17

4.1 Transport ... 17
4.2 Unpacking ... 17
4.3 Setting up ... 17
4.4 Ambient conditions ... 18
4.5 Electrical connection ... 18
4.5.1 Adapting to the mains ... 19

5 Initial start-up ... 20

5.1 Switching on ... 20
5.2 Switching off ... 20

6 Using the device ... 21

6.1 Setting the minimum gap width ... 22
6.2 Setting the gap width ... 23
6.3 Grinding with grinding disks of zirconium oxide ... 24

6.4 Adding material 25
6.5 Taking samples 26
6.6 Final fineness 26

7 Accessories 27

7.1 Dust extraction 27
7.2 Comminution of coarse material in combination with the Jaw Crusher PULVERISETTE 1 *classic line* 28

8 Cleaning 29

8.1 Sucking off dust after a grinding 29
8.2 Grinding chamber 29
8.3 Housing 30

9 Maintenance 31

9.1 Gear oil exchange 32
9.1.1 Carrying out a gear oil exchange 33
9.2 Rotation direction of the drive motor 34
9.3 Exchanging the grinding disks 34
9.3.1 Exchanging the fixed grinding disks 35
9.3.2 Exchanging the movable grinding disks 36

10 Repairs 38

10.1 Checklist for troubleshooting 38

11 Examples of grinding results 39

12 Disposal 40

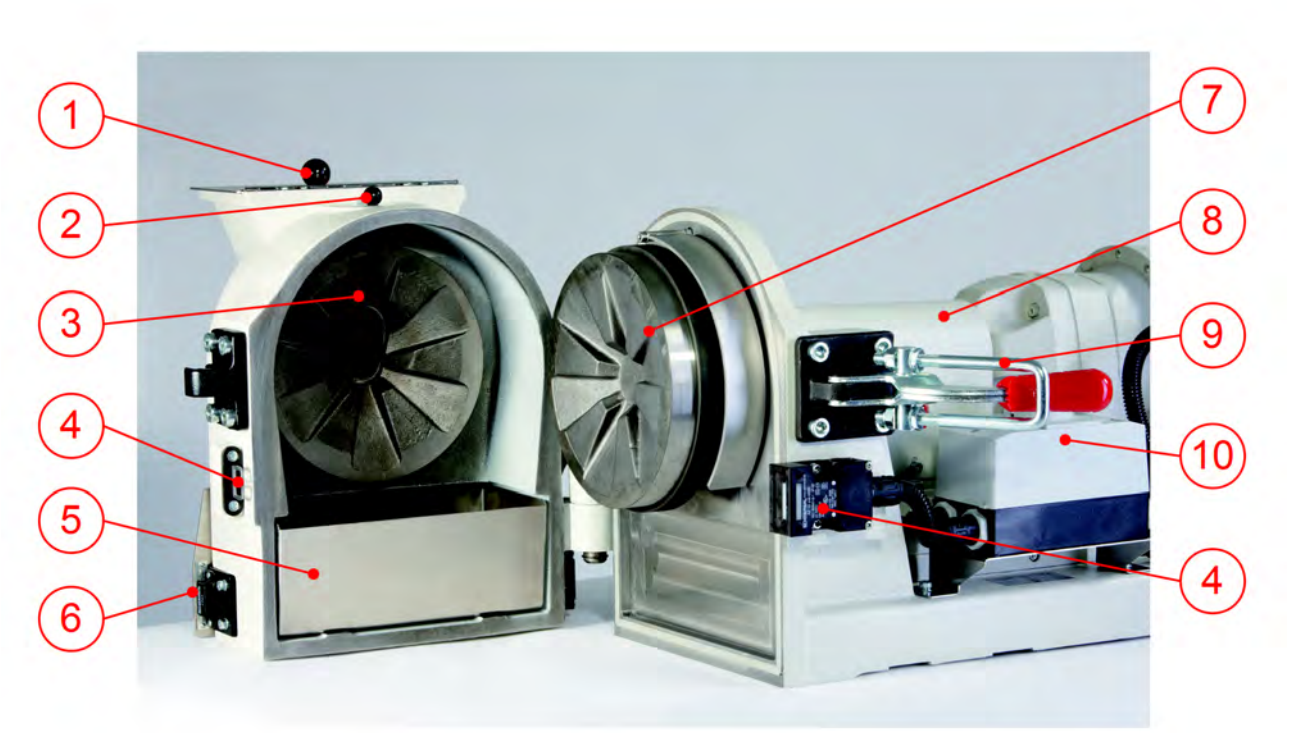
13 Guarantee terms 41

14 Exclusion of liability 43

15 Safety logbook 45

16 Index 46

1 Basic structure



1 Funnel with funnel lid
2 Cover for dust extraction / gap adjustment
3 Fixed grinding disk
4 Safety switch
5 Grinding stock container
6 Grinding stock container safety switch
7 Movable grinding disk
8 Coupling cover
9 Latch
10 Main switch

2 Safety information and use

2.1 Requirements for the user

This operating manual is intended for persons assigned with operating and monitoring the Fritsch PULVERISETTE 13 classic line. The operating manual and especially its safety instructions are to be observed by all persons working on or with this device. In addition, the applicable rules and regulations for accident prevention at the installation site are to be observed. Always keep the operating manual at the installation site of the PULVERISETTE 13 classic line.

People with health problems or under the influence of medication, drugs, alcohol or exhaustion must not operate this device.

The PULVERISETTE 13 classic line may only be operated by authorised persons and serviced or repaired by trained specialists. All commissioning, maintenance and repair work may only be carried out by technically qualified personnel. Qualified personnel are persons who, because of their education, experience and training as well as their knowledge of relevant standards, regulations, accident prevention guidelines and operating conditions, are authorised by those responsible for the safety of the machine to carry out the required work and are able to recognize and avoid possible hazards as defined for skilled workers in IEC 364.

In order to prevent hazards to users, follow the instructions in this manual.

Malfunctions that impair the safety of persons, the PULVERISETTE 13 classic line or other material property must be rectified immediately. The following information serves both the personal safety of operating personnel as well as the safety of the products described and any devices connected to them: All maintenance and repair work may only be performed by technically qualified personnel.

This operating manual is not a complete technical description. Only the details required for operation and maintaining usability are described.

Fritsch has prepared and reviewed this operating manual with the greatest care. However, no guarantee is made for its completeness or accuracy.

Subject to technical modifications.

2.2 Scope of application

PULVERISETTE 13 classic line is a disk mill for fine grinding by batches or continuous fine grinding of hard-brittle to medium-hard solids from the fields of mining and metallurgy, geology and mineralogy, and the glass and ceramics industry.

The feed size maximum is 20 mm per edge; the final fineness that can be achieved ranges from approx. 12 mm (greatest gap width) to 0.1 mm (smallest gap width) depending on the set gap width.

The material throughput of the disk mill lies in the range of 20 to 150 kg/h. This depends on the setting of the output gap as well as the bulk weight and the comminution characteristics of the sample.

2.2.1 Operating principle

The comminution of the material sample is done in a grinding chamber, which is sealed dust-proof to the outside, in which two roughly meshed grinding disks work against each other. The movable grinding disk is driven by a powerful, slowly running gear motor. (Depending on the voltage, 421 - 505 rpm, see *Chapter 3.7 'Speed' on page 15*)

The grinding stock is filled through a lockable funnel into the centre of the fixed grinding disk and is ejected after comminution from the gap between the two disks by pressure or shear stress. The gap width determines the mean particle feed size of the grinding stock. The grinding gap can be adjusted and controlled from the outside.

During grinding by batches, the grinding stock is collected in a grinding stock container inserted into the device. The closed construction prevents dust from escaping. A dust exhaust system can be attached optionally. For cleaning, the front housing is released with the latch (9) and swivelled open horizontally, providing access to the grinding chamber.

2.2.2 Drive motor

Drive by a 3~230 / 400 V motor.

The drive motor is a three-phase motor. Because of the drive's high reduction ratio, the disk mill comes to a standstill very quickly when switched off.

2.3 Obligations of the operator

Before using the PULVERISETTE 13 classic line, this manual is to be carefully read and understood. The use of the PULVERISETTE 13 classic line requires technical knowledge; only commercial use is permitted.

The operating personnel must be familiar with the content of the operating manual. For this reason, it is very important that these persons actually receive the present operating manual. Ensure that the operating manual is always near the device.

The PULVERISETTE 13 classic line may exclusively be used within the scope of applications set down in this manual and within the framework of guidelines put forth in this manual. In case of non-compliance or improper use, the customer assumes full liability for the functional capability of the PULVERISETTE 13 classic line and for any damage or injury arising from failure to fulfil this obligation.

By using the PULVERISETTE 13 classic line the customer agrees with this and recognizes that defects, malfunctions or errors cannot be completely excluded. To prevent risk of damage to persons or property or of other direct or indirect damage, resulting from this or other causes, the customer must implement sufficient and comprehensive safety measures for working with the PULVERISETTE 13 classic line.

Neither compliance with this manual nor the conditions and methods used during installation, operation, use and maintenance of the PULVERISETTE 13 classic line can be monitored by Fritsch GmbH. Improper execution of the installation can result in property damage and thus endanger persons. Therefore, we assume absolutely no responsibility or liability for loss, damage or costs that result from errors at installation, improper operation or improper use or improper maintenance or are in any way connected to these.

The applicable accident prevention guidelines must be complied with.

Generally applicable legal and other obligatory regulations regarding environmental protection must be observed.

2.4 Information on hazards and symbols used in this manual

Safety information

Safety information in this manual is designated by symbols. Safety information is introduced by keywords that express the extent of the hazard.

DANGER!
This symbol and keyword combination points out a directly hazardous situation that can result in death or serious injury if not avoided.

WARNING!
This symbol and keyword combination points out a possibly hazardous situation that can result in death or serious injury if not avoided.

CAUTION!
This symbol and keyword combination points out a possibly hazardous situation that can result in slight or minor injury if not avoided.

NOTICE!
This symbol and keyword combination points out a possibly hazardous situation that can result in property damage if not avoided.

ENVIRONMENT!
This symbol and keyword combination points out a possibly hazardous situation that can result in environmental damage if not avoided.

Special safety information

To call attention to specific hazards, the following symbols are used in the safety information:

DANGER!
This symbol and keyword combination points out a directly hazardous situation due to electrical current. Ignoring information with this designation will result in serious or fatal injury.

DANGER!
This symbol and keyword combination designates contents and instructions for proper use of the machine in explosive areas or with explosive substances. Ignoring information with this designation will result in serious or fatal injury.

DANGER!
This symbol and keyword combination designates contents and instructions for proper use of the machine with combustible substances. Ignoring information with this designation will result in serious or fatal injury.

WARNING!
This symbol and keyword combination points out a directly hazardous situation due to movable parts. Ignoring information with this designation can result in hand injuries.

WARNING!

This symbol and keyword combination points out a directly hazardous situation due to hot surfaces. Ignoring information with this designation can result in serious burn injuries due to skin contact with hot surfaces.

Safety information in the procedure instructions

Safety information can refer to specific, individual procedure instructions. Such safety information is embedded in the procedure instructions so that the text can be read without interruption as the procedure is being carried out. The keywords described above are used.

Example:

1. Loosen screw.
2.

   CAUTION!

   Risk of entrapment at the lid.

   Close the lid carefully.
3. Tighten screw.

Tips and recommendations

This symbol emphasises useful tips and recommendations as wells as information for efficient operation without malfunction.

Further designations

To emphasise procedure instructions, results, lists, references and other elements, the following designations are used in this manual:

Designation	Explanation
1., 2., 3. ...	Step-by-step procedure instructions
⇨	Results of steps in the procedure
↯	References to sections in this manual and relevant documentation
■	Lists without a specific order

Designation	Explanation
[Button]	Operating elements (e.g. push button, switch), display elements (e.g. signal lamps)
'Display'	Screen elements (e.g. buttons, function key assignment)

2.5 Device safety information

Please observe!

- Only use original accessories and original spare parts. Failure to observe this instruction can compromise the safety of the machine.
- Accident-proof conduct is to be strictly followed during all work.
- Comply with all currently applicable national and international accident prevention guidelines.

CAUTION!

Wear hearing protection!

If a noise level of 85 dB(A) is reached or exceeded, ear protection should be worn to prevent hearing damage.

WARNING!

The maximum accepted concentration (MAC) levels of the relevant safety guidelines must be observed; if necessary, ventilation must be provided or the machine must be operated under an extractor hood.

DANGER!

Explosion hazard!

– When grinding oxidizable substances, e.g. metals or coal, there is a risk of spontaneous combustion (dust explosion) if the share of fine particles exceeds a certain percentage. When grinding these kinds of substances, special safety measures must be taken and the work must be supervised from a specialist.
– The PULVERISETTE 13 classic line is not explosion protected and is not designed to grind explosive materials.

- Do not remove the information signs.

NOTICE!

Immediately replace damaged or illegible information signs.

- Unauthorised alteration of the PULVERISETTE 13 classic line will void Fritsch's declaration of conformity to European directives and void the guarantee.
- Only use the PULVERISETTE 13 classic line when it is in proper working order, as intended and in a safety- and hazard-conscious manner adhering to the operating manual. In particular, immediately rectify any malfunctions that could pose a safety hazard.
- If, after reading the operating manual, there are still questions or problems, please do not hesitate to contact our specialised personnel.

2.6 Protective equipment

Protective equipment is to be used as intended and may not be disabled or removed.

All protective equipment is to be regularly checked for integrity and proper functioning.

The disk mill features many safety devices:

1. The funnel (1) is protected against being reached into by a grid.
2. A safety switch (4) monitors the closing of the grinding chamber before operation and prevents the disk mill from starting up when the chamber is open.
3. A second safety switch (6) monitors the closing of the grinding stock container during operation and prevents the disk mill from starting up when the container is open.

CAUTION!
The grinding stock container and the grinding chamber are not locked by the safety switches.

The disk mill does not start up when the grinding chamber is open or the grinding stock container is missing. If the grinding mill is already running when one of these occurs, it will stop.

2.7 Hazardous points

CAUTION!

– Crushing hazard at the funnel cover (1).
– Crushing hazard at the grinding chamber latch (9).

2.8 Electrical safety

2.8.1 General information

The disk mill is switched on and off with a motor protection switch that is adapted to the mains voltage (according to the type plate).

- By turning the switch to **Start (I)**:
  → the disk mill starts up
- By turning the switch to **Stop (O)**:
  → the mill comes to a standstill within approx. 5 seconds
  → the grinding chamber can be opened
  → the grinding stock container can be removed

2.8.2 Protection against restart

The undervoltage release switches off if there is a power outage.

- The mill comes to a standstill in seconds.
  → the grinding chamber can now be opened
  → the grinding stock container can now be removed

When electrical power returns, the disk mill does not start up by itself.

- The disk mill is secured against restarting.
- By turning the switch to Start (I) the motor is switched on and the mill begins working.

2.8.3 Overload protection

The protection switch automatically cuts off the current supply (rotary switch goes to STOP (O)) as a result of overload or a defective motor or cable. After the malfunction has been rectified the device can be switched on again.

3 Technical data

3.1 Dimensions

400 x 440 x 870 mm (height x width x depth)

3.2 Weight

140 kg without grinding disks (net)

160 kg with grinding disks made of tungsten carbide

3.3 Operating noise

Emissions value of workplace according to DIN EN ISO 3746:2005 L_{Pa} = 81 dB(A).

3.4 Voltage

- 400 V / 3~ 50 Hz
- 230 V / 3~ 60 Hz

3.5 Current consumption

- 3.2 A at 400 V / 3~ 50 Hz
- 5.6 A at 230 V / 3~ 60 Hz

3.6 Power consumption

- 1830 W under high load (significantly less under normal application)
- 1800 W under high load (significantly less under normal application)

The device can only be operated on a three-phase power system.

Transient overvoltages in accordance with overvoltage category II are permitted. (See also *Chapter 4.5 'Electrical connection' on page 18*)

3.7 Speed

- 421 rpm at 50 Hz
- 505 rpm at 60 Hz

3.8 Electrical fuses

A thermal circuit breaker (motor protection switch) is integrated into the main switch (10) and triggers in the event of overheating; after a brief cooling period, it is ready to be restarted.

3.9 Material

- Maximum feeding size approx. 20 mm (depending on the material)
- Minimum feed quantity 20 - 30 ml
- Grinding by batches with grinding stock container (max. 2 l container volume)
- Maximum throughput 150 kg/h during continuous grinding

3.10 Final fineness

The final fineness lies between 0.1 and 12 mm.

4 Installation

4.1 Transport

The device is delivered on a transport pallet with a wooden cover. We recommend using a forklift or pallet truck for transporting the packed device.

DANGER!
Do not step under the transport pallet during transport.

WARNING!
Improper lifting can lead to personal injury or property damage. The machine is only to be lifted with suitable equipment and by qualified personnel.

The guarantee excludes all claims for damage due to improper transport.

4.2 Unpacking

- Pull out the nails that fasten the cover to the transport pallet. The cover is the wooden box that has been placed over the transport pallet.
- Lift the cover off of the transport pallet.

CAUTION!
Crushing hazard!
Always lift with 2 persons.

- Compare the contents of the delivery with your order.

4.3 Setting up

DANGER!
Do not step under the transport pallet during transport.

CAUTION!

The weight of the disk mill is approx. 160 kg with grinding disks.

NOTICE!

Place the disk mill on a flat, stable surface. It may be screwed to this or a base plate.

1. The disk mill is screwed to the transport palette from below using 3 screws. Loosen the screws with a spanner (17 mm).
2. Lash the harness to a crane or another hoist.
3. Next lash the harness to the eyelets.
4. Using the crane, bring the disk mill to the desired position. When positioning the device, make sure it does not swing when it is suspended from the crane.
5. Remove the harness.

4.4 Ambient conditions

WARNING!

Mains voltage!

- The device may only be operated indoors.
- The surrounding air may not carry any electrically conductive dust.
- Maximum relative humidity 80% for temperatures up to 31°C, linearly decreasing down to 50% relative humidity at 40°C.

- The room temperature has to stay between 5 - 40°C.
- Altitudes up to 2000 m
- Degree of pollution 2 according to IEC 664.

4.5 Electrical connection

Before establishing the connection, compare the voltage and current values stated on the type plate with the values of the power supply system to be used.

CAUTION!

Ignoring the values on the type plate may result in damage to the electrical and mechanical components.

4.5.1 Adapting to the mains

The disk mill is delivered with a connection voltage adapted to the electrical system of your country.

5 Initial start-up

The disk mill is delivered with mounted grinding disks. Check the gap width before the first grinding. (See *Chapter 6.2 'Setting the gap width' on page 23*). After the disk mill has been set up as described in *Chapter 4 'Installation' on page 17* and the mains plug has been plugged into the mains socket, the device is ready for operation.

CAUTION!

- Grinding disks must not touch each other.
- The device may be operated only when the grinding disks have been mounted and fixated.
- Smallest gap width 0.1 mm

5.1 Switching on

Switch main switch (10) to ON (I). The disk mill starts up.

5.2 Switching off

Switch main switch (10) to OFF (O). The disk mill stops within a few seconds.

6 Using the device

WARNING!

If the grinding elements used are not original accessories, we provide no guarantee and exclude all liability for damage to the device.

WARNING!

Make sure before starting the machine that the grinding disks have been mounted properly and that there are not any loose parts inside the device. Failure to observe this provision will void the guarantee and releases us from liability for any resulting damage to the device or personal injury.

CAUTION!

- Grinding disks must not touch each other.
- The device may be operated only when the grinding disks have been mounted and fixated.
- Smallest gap width 0.1 mm

CAUTION!

The device may not be run unsupervised.

NOTICE!

Grinding disks are worn down during grinding. That is why the grinding gap needs to be checked and readjusted if necessary depending on the use and the degree of wear. This is done as described in *Chapter 6.1 'Setting the minimum gap width' on page 22* and *Chapter 6.2 'Setting the gap width' on page 23*.

6.1 Setting the minimum gap width

The minimum gap width is limited to 0.1 mm in the condition of delivery.

A stop screw with lock nut is located at the back left of the sliding table, which limits the forward movement of the sliding table. This prevents the grinding disks from touching inadvertently.

The minimum gap width has to be reset after every change or prolonged use of the grinding disks. Grinding disks may have different thicknesses depending on the wear.

The procedure for setting the minimum gap width is as follows:

1. The stop screw has to be readjusted. To do this, remove the black cover cap.

2. Remove the lock nut with a 13 mm spanner.

3. Turn the stop screw back by using a 4 mm hexagon socket screw key to turn it to the left (max. 2 turns).

4. With a feeler gauge (if unavailable normal printer paper that has been folded once can also be used), set the gap to 0.1 mm using the rotary handle.

This is set through a viewing gap above the grinding chamber (2). The feeler gauge can be inserted through the opening to set or check the gap width.

The feeler gauge must only be lightly clamped and it must be possible to pull it out again by hand without any problems.

5. Turn the stop screws all the way round and secure the lock nut again. Reposition the cover cap.

6.2 Setting the gap width

Setting the gap width between the two grinding disks is carried out by simply adjusting the rotary handle attached below the drive motor with scaling (1 graduation mark - 0.02 mm).

Make sure that the gap width is always turned from a bigger to a smaller distance with the rotary handle. If the gap width is increased during grinding, this can lead to an imprecise grinding result because of the play in the thread.

You should pre-crush material that is difficult to grind in a first pass with a larger gap width, before achieving the desired fineness with a smaller gap in a second pass.

Proceed in the same way if no information about the grindability of your material is available. In this case, it is necessary to carry out preliminary tests with small sample quantities.

6.3 Grinding with grinding disks of zirconium oxide

When grinding with zirconium oxide grinding disks, certain work precautions need to be observed:

1. Precise setting of the smallest gap. The disks may under no circumstances touch each other during the grinding. The local heating promptly causes tension fissures at the circumference. These fissures appear very quickly and are easily detected.
2. Local heating can also occur if you fill in so much material that a comminution of a bed of material takes place constantly on the outer edges of the grinding disk (grinding gap completely filled with sample material). This leads to tension fissures at the grinding disk's circumference and even its breaking.
3. The hardness of the zirconium oxide grinding disk is 8.5 Mohs (HV1350). No harder sample material may be comminuted (maximum Mohs hardness of 7), because this causes the outer edges of the grinding disk to break.
4. Proceed very cautiously when grinding with zirconium oxide grinding disks. You should pre-crush the grinding stock in a first pass with a larger gap width, before achieving the desired fineness with the smallest gap in a second pass. If you do not have any information about the grindability of your material, carry out preliminary tests with small sample quantities. The grinding disks have a progressing breakage geometry. Rough comminution takes place in the inner area and fine comminution takes place in the outer area of the grinding disk. The stress is greatest in the area of the fine comminution. The described breakage could occur here with very hard sample materials.
5. The adhesive used to glue the fastening bolts into the zirconium oxide grinding disks has a temperature resistance of up to 80 °C. The grinding disks should therefore not be heated to above 80 °C so that a firm seat in the mount is ensured.
6. Please observe the operating instructions concerning the mounting and removing of the grinding disks. *Chapter 9.3 'Exchanging the grinding disks' on page 34*

NOTICE!

Fritsch GmbH guarantees that it delivers zirconium oxide grinding disks of only the utmost quality.

Used grinding disks that are cracked at the circumference, chipped or completely broken cannot be recognised for claims.

6.4 Adding material

DANGER!

Explosion hazard!

– When grinding oxidisable substances, e.g. metal or coal, there is a risk of spontaneous combustion (dust explosion) if the proportion of fine particles exceeds a certain percentage. When grinding these kinds of substances, special safety measures must be taken and the work must be supervised by a specialist.

– The device is not explosion-protected and is not suitable for grinding explosive materials.

CAUTION!

Switch the device on before filling material into the funnel.

Before switching on the device, make sure that the grinding chamber is closed and that the grinding stock container is not wedged in, but is inserted straight into the drawer.

- Only fill in so much material that the funnel's lid can still be closed.
- The maximum quantity fed in depends on the grindability of the material and the sample volume of the grinding stock container.
- Observe the grinding process (grinding sound) and determine the optimal filled in quantity. Repeat this for each new material.
- Do not refill more material until the grinding sound has lowered.
- Put large lumps of material (up to 20 mm per edge) into the funnel singly; close the lid.

NOTICE!

The grinding disk holder and the housing are made of spheroidal graphite cast iron. This steel cast is not stainless. If you comminute sample material that is slightly moist, then after the grinding, you need to dry off the back side of the grinding disks, the inner side of the grinding disk holder and all parts of the housing that comes into contact with the samples. If you do not do this, then you can count of corrosion.

6.5 Taking samples

Depending on the quantity of the ground material, be sure to use both hands when taking out the grinding stock container. Hazard of tipping!

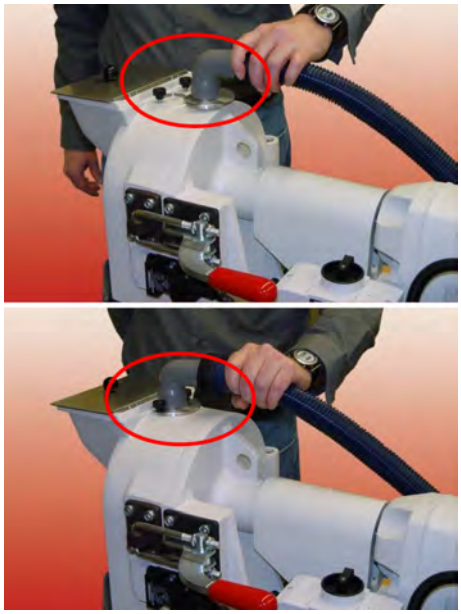
6.6 Final fineness

The final fineness that can be achieved depends on the selected gap width (approx. 0.1 mm to approx. 12 mm). The gap width determines just one dimension of the individual particles in the fine ground material. For example, material breaking in platelet form may well contain greater dimensions in one extension direction. Normally however, with this type of material, the amount of samples with larger dimensions in this extension direction is also reduced significantly after a second grinding pass.

7 Accessories

7.1 Dust extraction

- 43.9050.00 Dust exhaust system, dust category "M" (43.9060.00 Dust exhaust system, dust category "H")
- 43.9051.00 Polyester filter set (pack of 2)
- 43.9052.00 Plastic bag (pack of 5)
- 43.9055.00 Paper filter bag (pack of 5)



After a grinding process has ended, you can suck off the dust that has accumulated during grinding, by attaching the vacuum cleaner connection piece (order no.: 13.1450.00) to the window in the grinding chamber (checking the gap adjustment). Assemble the connection piece and the vacuum cleaner exhaust hose as shown in the images.

Do not switch the vacuum cleaner on during grinding, as sample material may be sucked off as well.

7.2 Comminution of coarse material in combination with the Jaw Crusher PULVERISETTE 1 *classic line*

The disk mill PULVERISETTE 13 classic line is used in combination with the Jaw Crusher PULVERISETTE 1 *classic line* for comminution of coarse material before its subsequent use.

The comminution is done in this combination in a single pass with 95 mm (or 65 mm) feed size up to an average particle feed size (d_{50}) of 0.1 mm.

The jaw crusher is placed on a mounting rack (order no. 43.5100.00) over the disk mill. The material roughly crushed in the jaw crusher passes via a hopper directly into the funnel of the disk mill.

CAUTION!

Feed in only as much sample material into the PULVERISETTE 1 *classic line* as the PULVERISETTE 13 *classic line* itself can grind. (This depends on gap width; comminution by batches with collection container: max. 2 L sample material)

8 Cleaning

DANGER!

Mains voltage!

- Before beginning with cleaning work, disconnect the mains plug and protect the device against being unintentionally switched back on!
- Do not allow any liquids to flow into the device.
- Indicate cleaning work with warning signs.
- Put safety equipment back into operation after cleaning work.

NOTICE!

The grinding disk holder and the housing are made of spheroidal graphite cast iron. This steel cast is not stainless. If you comminute sample material that is slightly moist, then after the grinding, you need to dry off the back side of the grinding disks, the inner side of the grinding disk holder and all parts of the housing that comes into contact with the samples. If you do not do this, then you can count of corrosion.

8.1 Sucking off dust after a grinding

After a grinding process has ended, you can suck off the dust that has accumulated during grinding. Install the dust extraction as described in *Chapter 7.1 'Dust extraction' on page 27*.

NOTICE!

Do not switch the dust extraction on during grinding, as otherwise sample material may be sucked off as well.

8.2 Grinding chamber

Open the grinding chamber to clean it. Use a narrow and/or wide brush and a vacuum cleaner to clean out the grinding chamber. If necessary, you can also apply liquid cleansers (alcohol, benzine). Watch for possible corrosion though when using water-based fluids. Be sure to dry out the disk mill thoroughly.

WARNING!

Danger of poisoning and fire!

When using flammable or noxious cleansers, be sure to observe the valid safety regulations (MAK values) and clean the disk mill in a well-ventilated safety area if necessary.

8.3 Housing

The outside of the machine can be cleaned with a soft, damp cloth when it is in the switched off state. A solution of water and a mild detergent can be used for that.

Do not use solvents for cleaning.

9 Maintenance

DANGER!

Mains voltage

- Before beginning with maintenance work, unplug the mains plug and protect the device against being unintentionally switched back on again!
- Indicate maintenance work with warning signs.
- Maintenance work may only be performed by specialised personnel.
- Put safety equipment back into operation after maintenance or repair work

We recommend keeping a safety logbook Chapter 15 'Safety logbook' on page 45, where all work (maintenance, repairs.....) performed on the device is entered.

- *The most important element of maintenance is regular cleaning:*
- *When cleaning the complete device, adhere to the guidelines of the Accident Prevention Regulation (BGV A3) - especially if the device has been set up in a dusty environment or if the processed source material produces dust.*

Functional part	Task	Test	Maintenance interval
Protection switch 1 (activated by closing the grinding chamber)	Start-up block	Grinding chamber open: Mill does not start! Caution! If the switch is defective, the disks will start up. Do not reach into the mill while it is running.	Before each use (replace defective switch)
Protection switch 2 (activated by closing the grinding stock container)	Start-up block	Grinding stock container not inserted: Mill does not start up! Caution! If the switch is defective the mill will start up. Do not reach into the mill while it is running.	Before each use (replace defective switch)
Grinding disk gap width	Break function	Test distance The gap must be at least 0.1 mm.	Before each use

9.1 Gear oil exchange

The gears of the motor are filled with gear oil at delivery (ISO VG 220 Ord. no.: 85.0110.00). To change the gear oil, there is an unscrewable filler screw at the top of the gear housing.

The oil needs to be changed after approx. 5 years.

9.1.1 Carrying out a gear oil exchange

1. Have the PULVERISETTE 13 classic line run for approx. 15 minutes so that the gear oil inside warms up and drains better.

2. Remove the coupling cover by unscrewing the fastening screws with a no. 4 hexagon socket screw key on both sides.

3. Take off the coupling cover.

4. Remove the motor fastening screw under the oil drain screw with a no. 6 hexagon socket screw key.

5. Hold a 25 ml laboratory scoop under the oil drain screw and unscrew the screw with a no. 5 hexagon socket screw key. Hold the oil drain screw with the hexagon socket screw key. The oil flows into the laboratory scoop.
6. If the laboratory scoop is full, screw in the oil drain screw and empty the scoop into a container that is at least 250 ml.
7. Repeat steps 5 and 6 until all the gear oil has run out of the gears.
8. Wipe up any oil that spills with a paper towel and clean the contact surface of the oil drain screw.
9. Screw the oil drain screw and sealing washer back in firmly. Reassemble the motor fastening screw and the coupling cover.

10. After this, unscrew the filling screw with a no. 11 hexagon socket screw key.
11. Insert a funnel into the bore hole and fill the gears with 0.22 litre ISO VG 220 gear oil, (order no.: 85.0110.00).
12. Screw in the filling screw with the clean seal ring.

9.2 Rotation direction of the drive motor

DANGER!

Mains voltage!

Changes to the rotation direction may only be made by a qualified technician.

The rotation direction of the three-phase motor is user-defined. See:

DIN VDE 0530 part 8 "Connection Designation and Rotation Direction"

DIN VDE 0530 part 7 / EN 60 934-7 "Identification Symbols for Models"

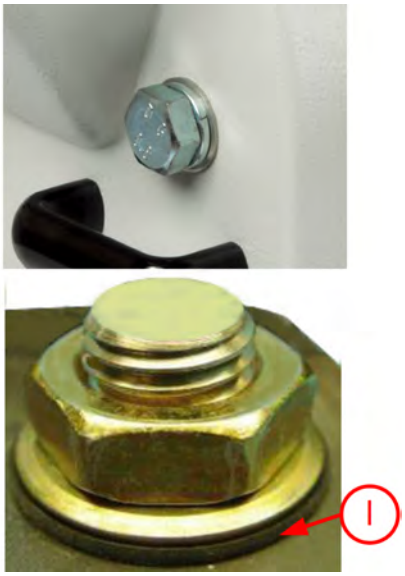
Because the grinding disks are rotationally symmetrical, you can change the rotation direction of the disk mill if the front cutting edges are severely worn. This can increase the service life of the grinding disk. (See *Chapter 9.3 'Exchanging the grinding disks' on page 34*).

The change of the rotation direction is carried out by swapping two supply lines "L1, L2, L3" (or of the power supply line "U1, U2, U3" in the socket).

9.3 Exchanging the grinding disks

CAUTION!

- Crushing hazard when exchanging the grinding disks.
- Secure the grinding disks against falling while exchanging them.



CAUTION!

Clean the holder and the back of the disks thoroughly before installing the new disks. This is very important in particular when employing the ZrO_2 and WC+Co disks, so that the disks are seated without tension and parallel to each other.

When using the ZrO_2 grinding disks:

When tightening the screws, it is important that the tightening torque is not too great (see table) and is the same for both screws.

The ZrO_2 grinding disks come with rubber washers (I) that are placed under the steel washers. The nuts are then tightened until the rubber washer is slightly squeezed out by the steel washer. This ensures a tightening torque of approx. 20 Nm.

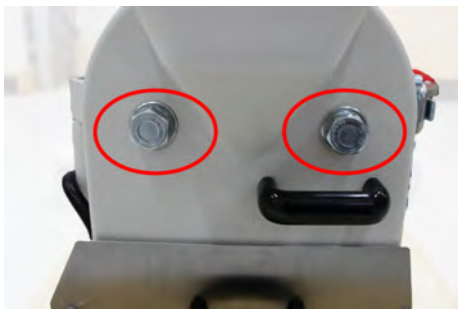
All other grinding disks (as pictured above) are fastened with two hexagon screws M20 x 35 and with a washer and a spring ring.

NOTICE!

Hold the grinding disks firmly during the exchange and do not drop them. This can cause disks made of zirconium oxide to break or splinter.

The grinding disks wear down after a certain time, depending on the material being crushed. Check the surfaces at regular intervals. For changing the direction of rotation or exchanging the disks, observe the information in *Chapter 9.2 'Rotation direction of the drive motor' on page 34* and as follows in *Chapter 9.3.1 'Exchanging the fixed grinding disks' on page 35* as well as *Chapter 9.3.2 'Exchanging the movable grinding disks' on page 36*.

9.3.1 Exchanging the fixed grinding disks



1. Loosen the fastening screws (fastening nuts for ZrO_2) with a 30 mm spanner before opening the grinding chamber.

2. Open the grinding chamber.
3. Hold the fixed grinding disk tightly from the inside and remove the fastening screws or fastening nuts.
4. Remove the fixed grinding disk and clean the surfaces. Reverse the steps to insert the replacement grinding disk.

9.3.2 Exchanging the movable grinding disks

1. Open the grinding chamber.
2. To be able to remove the fastening screws (fastening nuts for ZrO_2) behind the movable grinding disk, this has to be moved far forward.

3. To do this, remove the cover cap of the stop screw.
4. Remove the lock nut with a 13 mm spanner and turn the stop screw back using a 4 mm hexagon socket screw key.
5. Use the rotary handle to turn the movable disk so far forward that the coupling cover (9) is touching the housing.

6. Block the movable grinding disk.

   Remove both fastening screws for the movable grinding disk with a 30 mm spanner.
7. Hold the movable grinding disk tightly and remove the fastening screws.
8. Remove the movable grinding disk and clean the surfaces. Reverse the steps to insert the replacement grinding disk.
9. Move the movable grinding disk back again using the rotary handle and close the grinding chamber.

NOTICE!

The movable grinding disk has to be moved back until the two grinding disks no longer touch when closing. Otherwise there is a risk that the grinding disks will be destroyed.

10. Now the smallest gap width must be set, as explained in *Chapter 6.1 'Setting the minimum gap width' on page 22*.

Material	Reference value for max. tightening torque (Nm)	Density g/cm³	Abrasion resistance	Use for material to be crushed	Order number fixed disk:	Order number movable disk:
Tempered steel cast 11-12% Cr	**at least 50**	7,9	Good	Hard, brittle sample material	13.1100.09	13.1110.09
Manganese steel 12-13% Mn	**at least 50**	7,9 - 8	Good	Hard, brittle sample material	13.1120.23	13.1130.23
Tungsten carbide 90.3% WC + 9.5% Co	**at least 50**	14,8	Very good	Hard, abrasive sample material	13.2000.08	13.2010.08
Zirconium oxide 94.5 % ZrO2	**approx. 20**	6,0	Extremely good	Medium-hard, abrasive sample material for iron-free grinding	13.2100.27	13.2110.27

10 Repairs

DANGER!

Mains voltage!

- Before beginning with repair work, unplug the mains plug and protect the device against being unintentionally switched back on.
- Indicate repair work with warning signs.
- Repair work may only be performed by specialised personnel.
- Put safety equipment back into operation after maintenance work.

10.1 Checklist for troubleshooting

Fault description	Cause	Remedy
Mill does not start up	No mains connection	Plug in mains plug
	Grinding chamber safety switch is open	Close the grinding chamber properly
	Grinding stock container safety switch open	Insert the grinding stock container properly
	Overload of the motor	Allow motor protection switch to cool down
Grinding disks are not rotating	Grinding disks are touching (gap width < 0.1 mm)	Set gap width or stop screw, see *Chapter 6.1 'Setting the minimum gap width' on page 22*
Mill stops running during operation	Overload! Switching off by motor protection switch	Allow the mill to cool down, reduce sample addition
	Grinding chamber overfilled, jamming of grinding stock that is too large/hard	Open grinding chamber and empty
Mill has poor grinding result	Grinding disks worn down	Reverse direction of rotation or replace grinding disk. See *Chapter 9.3 'Exchanging the grinding disks' on page 34* and *Chapter 9.2 'Rotation direction of the drive motor' on page 34*.
	Grinding disks not parallel	Remove grinding disks, clean holder and reinsert
Grinding stock escapes	Grinding chamber or grinding stock container seals is soiled or defective	Clean or replace seals

11 Examples of grinding results

- Particle feed size 20 mm
- Feed quantity 1 kg
- Material sorted from hard to medium-hard

Grinding stock	Grinding duration (min.)	Gap adjust-ment (mm)	Particle feed size analysis (µm)		Throughput kg/h
			90%<	50%<	
Basalt	2,1	1,0		600	28
	3,5	0,1	220	60	17
Clinker	1,5	1,0		800	36
	10,0	0,1	220	60	6
Slate	1,4	1,0		1500	45
	2,2	0,1	250	90	27
Hard coal	3,5	1,0		800	17
	13,5	0,1	250	100	4
Coke	5,3	1,0		400	11
	9,0	0,1	400	200	5
Lime-stone	2,0	1,0	1000	420	30
	6,3	0,1	210	100	10
Thomas meal (potash)	1,3	1,0	1000	350	45
	2,3	0,5	350	150	26
Pumice stone	1,7	1,0	1100	450	35
	5,0	0,1	150	30	12

12 Disposal

It is hereby confirmed that FRITSCH has implemented the directive 2002/95/EC of the European Parliament and Council from 27th January 2003 for the limitation of the use of certain dangerous substances in electrical and electronic devices.

FRITSCH has registered the following categories according to the German electrical and electronic equipment act, section 6, paragraph 1, clause 1 and section 17, paragraphs 1 and 2:

Mills and devices for the preparation of samples have been registered under category 6 for electrical and electronic tools (except for large stationary industrial tools).

Analytical devices have been registered under category 9, monitoring and control instruments.

It has been accepted that FRITSCH is operating only in the business-to-business area. The German registration number for FRITSCH is WEEE reg. no. DE 60198769

FRITSCH WEEE coverage

Since the registration of FRITSCH is classified for bilateral transactions, no legal recycling or disposal process is described. FRITSCH is not obliged to take back used FRITSCH devices.

FRITSCH declares it is prepared to take back used FRITSCH devices for recycling or disposal free of charge whenever a new device is purchased. The used FRITSCH device must be delivered free of charge to a FRITSCH establishment.

In all other cases FRITSCH takes back used FRITSCH devices for recycling or disposal only against payment.

13 Guarantee terms

Guarantee period

As manufacturer, FRITSCH GmbH provides – above and beyond any guarantee claims against the seller – a guaranty valid for the duration of two years from the date of issue of the guarantee certificate supplied with the device.

Within this guarantee period, we shall remedy all deficiencies due to material or manufacturing defects free of charge. Rectification may take the form of either repair or replacement of the device, at our sole discretion. The guarantee may be redeemed in all countries in which this FRITSCH device is sold with our authorisation.

Conditions for claims against the guarantee

This guarantee is subject to the condition that the device is operated according to the instructions for use / operating manual and its intended use.

Claims against the guarantee must include presentation of the original receipt, stating the date of purchase and name of the dealer, together with the complete device type and serial number.

For this guarantee to take effect, the answer card entitled "Securing of Guarantee" (enclosed with the device) must be properly filled out and despatched without delay after receipt of the device and be received by us within three weeks or alternatively, *online registration* must be carried out with the above-mentioned information.

Reasons for loss of the guarantee

The guarantee will not be granted in cases where:

- Damage has arisen due to normal wear and tear, especially for wear parts, such as: Crushing jaws, support walls, grinding bowls, grinding balls, sieve plates, brush strips, grinding sets, grinding disks, rotors, sieve rings, pin inserts, conversion kits, sieve inserts, bottom sieves, grinding inserts, cutting tools, sieve cassettes, sieve and measuring cell glasses.
- Repairs, adaptations or modifications were made to the device by unauthorized persons or companies.
- The device was not used in a laboratory environment and/or has been used in continuous operation.
- Damage is present due to external factors (lightning, water, fire or similar) or improper handling.
- Damage is present that only insubstantially affects the value or proper functioning of the device.
- The device type or serial number on the device has been changed, deleted, removed or in any other way rendered illegible
- The above-mentioned documents have been changed in any way or rendered illegible.

Guarantee terms

Costs not covered by the guarantee

This guarantee excludes any costs for transport, packaging or travel that accrue in the event the product must be sent to us or in the event that one of our specialist technicians is required to come to your site. Any servicing done by persons not authorised by us and any use of parts that are not original FRITSCH accessories and spare parts will void the guarantee.

Further information about the guarantee

The guarantee period will neither extend nor will a new period of guarantee begin in the event that a claim is placed against the guarantee.

Please provide a detailed description of the type of error or the complaint. If no error description is enclosed, we shall interpret the shipment as an assignment to remedy all recognisable errors or faults, including those not covered by the guarantee. Errors or faults not covered by the guarantee shall in this case be rectified at cost.

We recommend reading the operating manual before contacting us or your dealer, in order to avoid unnecessary inconvenience.

Ownership of defective parts is transferred to us with the delivery of the replacement part; the defective part shall be returned to us at buyer's expense.

NOTICE!

Please note that in the event that the device must be returned, the device must be shipped in the original Fritsch packaging. Fritsch GmbH denies all liability for any damage due to improper packaging (packaging not from Fritsch).

Any enquiries must include a reference to the serial number imprinted on the type plate.

14 Exclusion of liability

Before using the product, be sure to have read and understood this operating manual.

The use of the product requires technical knowledge; only commercial use is permitted.

The product may be used exclusively within the scope of applications set down in this operating manual and within the framework of guidelines put forth in this operating manual and must be subject to regular maintenance. In case of non-compliance, improper use or improper maintenance, the customer assumes full liability for the functional capability of the product and for damage or injury arising from violating these obligations.

The contents of this operating manual are subject in entirety to copyright law. This operating manual and its contents may not be copied, further distributed or stored in any form, in part or in whole, without the prior written consent of Fritsch.

This operating manual has been prepared to the best of our knowledge and checked for accuracy at the time of printing. FRITSCH GMBH assumes no guarantee or liability whatsoever for the accuracy or completeness of the contents of this operating manual, including but not limited to the implied warranties of merchantability and fitness for a particular purpose, unless liability is expressly prescribed by applicable laws or jurisprudence.

FRITSCH GMBH expressly reserves the right to modify and/or update this operating manual without prior notice. The same applies to modifications and improvements to the products described in this operating manual. It is the responsibility of the user to ensure that they have the current version of this operating manual. For more information, please contact your local FRITSCH GMBH distributor or Fritsch GmbH, Industriestr. 8, D-55473 Idar-Oberstein.

Not all parts shown here are necessarily installed in the product. The buyer is not entitled to delivery of these parts. If interested, please contact your local FRITSCH GMBH distributor or Fritsch GmbH, Industriestr. 8, D-55743 Idar-Oberstein.

FRITSCH GMBH takes the greatest care to ensure that the quality, reliability and safety of your products are continuously improved and adapted to the state of the art. The supplied products as well as this operating manual conform to the current state of the art when they leave the sphere of influence of FRITSCH GMBH.

By using the product the customer agrees with this and recognizes that defects, malfunctions or errors cannot be completely excluded. To prevent risk of damage to persons or property or of other direct or indirect damage, resulting from this or other causes, the customer must implement sufficient and comprehensive safety measures for working with the product.

Exclusion of liability

Fritsch GmbH excludes any liability, warranty, or other obligation to compensate for damages, regardless of whether this liability, warranty, or other obligation is explicit or implicit, contractual or arising from unlawful acts or prescribed contractually, by law, or otherwise. In no event shall the buyer be entitled to any compensation from Fritsch GmbH for any special, direct, indirect, coincidental or consequential damage, including but not limited to lost profits, lost savings, lost sales or financial loss of any kind or for compensation of third parties, for downtimes, for lost goodwill, for damage to or replacement of equipment and property, for costs or restoration of materials or goods related to the product or the use of our products, for other damage or injury to persons (including fatal injuries) or similar. The above exclusion of liability is limited by mandatory liability as prescribed by laws or jurisprudence. Liability for negligence is excluded in all cases.

No permission is given expressly, implicitly or otherwise for the use of patents, brands or other copyrights. We also assume no liability for copyright infringements or infringements of the rights of third parties arising from the use of this product.

Neither compliance with this operating manual nor the conditions and methods used during installation, operation, use and maintenance of the product can be monitored by Fritsch GmbH. Improper execution of the installation can result in property damage and thus endanger persons. Therefore, we assume absolutely no responsibility or liability for loss, damage or costs that result from errors at installation, improper operation or improper use or improper maintenance or are in any way connected to these.

15 Safety logbook

Date	Maintenance / Repair	Name	Signature

16 Index

A

Accident prevention 7
Adapting to the mains 19
Adding material 25
Ambient conditions 18
Authorised persons 7

C

Checklist for troubleshooting 38
Cleaning 29
  after a grinding 29
  the grinding chamber 29
  the housing 30
Comminution of coarse material 28
Current consumption 15

D

Dimensions 15
Disposal 40
Drive motor 8
Dust extraction 27

E

Electrical connection 18
Electrical fuses 16
Electrical safety 14
Examples of grinding results 39
Exchanging the grinding disks 34
Exclusion of liability 43
Explanation of signs 9
Explanation of symbols 9

F

Final fineness 16, 26

G

Gear oil exchange 32
Guarantee terms 41

H

Hazardous points 14

I

Initial start-up 20

M

Maintenance 31

O

Operating noise 15
Overload protection 14

P

Power consumption 15
Protection against restart 14
Protective equipment 13

R

Repairs 38
Requirements for the user 7
Rotation direction of the drive motor 34

S

Safety information 9
Safety logbook 45
Sample material 16
Scope of application 7
Setting the gap width 23
Setting the minimum gap width 22
Setting up 18
Skilled workers 7
Switching off 20
Switching on 20

T

Taking samples 26

U

Using the device 21

V

Voltage 15

W

Warning information 9
WEEE 40
Weight 15

Z

Zirconium oxide grinding disks 24

© 2014

Fritsch GmbH
Milling and Sizing
Industriestraße 8
D - 55743 Idar-Oberstein
Telephone: +49 (0)6784/ 70-0
Fax: +49 (0)6784/ 70-11
email: info@fritsch.de
Internet: www.fritsch.de